

WHAT IS CLAIMED IS:

1. A method of forming an optical waveguide in the interior of a pure silica glass comprising:
focusing femtosecond laser pulses on said glass to form a high refractive index region,
wherein a mode field diameter of said optical waveguide is controlled by changing the
pulse width of said femtosecond laser pulses.
2. A method of forming an optical waveguide according to claim 1 wherein
the pulse width of said femtosecond laser pulses is not greater than 420 fs.
3. A method of forming an optical waveguide according to claim 1 wherein
the pulse width of said femtosecond laser pulses is in a range of 210 to 420 fs.
4. A method of forming an optical waveguide in the interior of a pure silica
glass comprising:
focusing femtosecond laser pulses on said glass to form a high refractive index region,
wherein an aspect ratio of the mode field diameter of said optical waveguide is
controlled by changing the peak power of said femtosecond laser pulses at the focal point.
5. A method of forming an optical waveguide according to claim 4 wherein
the peak power of said femtosecond laser pulses at the focal point is not greater than $8.7 \times 10^{11} \text{ W/cm}^2$.
6. A method of forming an optical waveguide in the interior of a pure silica
glass comprising:
focusing femtosecond laser pulses to form a high refractive index region,

wherein both a mode field diameter and an aspect ratio of the mode field diameter of said optical waveguide is controlled by changing both the pulse width of said femtosecond laser pulses and the peak power of said femtosecond laser pulses at the focal point.

7. A method of forming an optical waveguide according to Claim 6 wherein the pulse width of said femtosecond laser pulses is not longer than 490 fs; and the peak power of said femtosecond laser pulses at the focal point is not greater than $8.7 \times 10^{11} \text{ W/cm}^2$.

8. A method of forming an optical waveguide according to Claim 6 wherein the pulse width of said femtosecond laser pulses are not longer than 420 fs; and the peak power of said femtosecond laser pulses at the focal point is not greater than $8.7 \times 10^{11} \text{ W/cm}^2$.

9. A method of forming an optical waveguide according to Claim 6 wherein the pulse width of said femtosecond laser pulses is in range of 210 fs to 420 fs; and the peak power of said femtosecond laser pulses at the focal point is not greater than $8.7 \times 10^{11} \text{ W/cm}^2$.

10. An optical waveguide which is formed by using a method according to any one of claims 1 to 9.

11. An optical waveguide which is formed by using a method according to any one of claims 1 to 9 wherein:
a mode field diameter of said waveguide is in a range of 10 to 14 μm ;
and an aspect ratio of the mode field diameter of said optical waveguide is in a range of 0.9 to 1.1.